

STUDY MODULE DESCRIPTION FORM		
Name of the module/subject Mechanical Measurement		Code 1010601241010610398
Field of study Transport	Profile of study (general academic, practical) (brak)	Year /Semester 2 / 4
Elective path/specialty -	Subject offered in: Polish	Course (compulsory, elective) obligatory
Cycle of study: First-cycle studies	Form of study (full-time, part-time) full-time	
No. of hours Lecture: - Classes: - Laboratory: 1 Project/seminars: -		No. of credits 2
Status of the course in the study program (Basic, major, other) (brak)		(university-wide, from another field) (brak)
Education areas and fields of science and art technical sciences		ECTS distribution (number and %) 2 100%
Responsible for subject / lecturer: dr inż. Andrzej Sz. Waliszewski email: andrzej.waliszewski@put.poznan.pl tel. 61 665 22 32 Wydział Maszyn Roboczych i Transportu ul. Piotrowo 3, 60-965 Poznań		
Prerequisites in terms of knowledge, skills and social competencies:		
1	Knowledge	Has a basic knowledge of physics concerning electric and magnetic circuits. Knows the basic laws of mechanics and strength of materials. He knows the SI units.
2	Skills	Knows how to operate a computer and use its basic programs, including Excel to develop measurements. He can use basic measuring instruments.
3	Social competencies	Can work together in a group, taking the different roles resulting from the execution of the tasks in a specific time. Can take care to preserve the basic principles of health and safety when performing laboratory work.
Assumptions and objectives of the course: Understanding the structure and principles of operation of the sensors and their use in measuring systems.		
Study outcomes and reference to the educational results for a field of study		
Knowledge: 1. Knows the methods of measurement of basic mechanical values (constants in time and variables over time). Knows the structure, operation and purpose of the sensors and the scope of their application. - [K1A-W16] 2. Knows the ways of recording the results of measurements and basic methods of developing them. - [K1A-W16]		
Skills: 1. Is able to choose the sensors, instruments and apparatus and to realize measurements of selected mechanical values. Can plan and carry out measurements to develop and present their results in a communicative way. - [K1A-U07] 2. Is able to formulate conclusions from the results. - [K1A-U07]		
Social competencies: 1. Is aware of the need to take measurements of the different mechanical values for diagnosis, decision-making, design, operational. Is aware of the need to transfer their knowledge to the public, making efforts so as to be understood. - [K1A_K08]		
Assessment methods of study outcomes		
Assessment based on the current control of the theoretical preparation for each laboratory and made reports.		
Course description		

The use of strain gauges for measuring static and dynamic stress states of machine parts using the angle sensor and a digital recorder. Measurements of time-variable speed on the example of a cross-shaft coupling. Optoelectronic sensors in the computer system. Torque measurement using inductive and strain gauge sensors.

Determination of critical speed of shafts with the use of laser and electro-magnetic speed sensors and capacitive sensor to measure vibration.

Programming virtual measurement systems using Agilent Visual Engineering Environment (VEE).

The use of potentiometric displacement transducer to map the path of of moving machine parts and registration results using VEE system.

Basic bibliography:

1. Materiały i instrukcje do ćwiczeń laboratoryjnych z przedmiotu ?Pomiary wielkości mechanicznych? , Instytut MRiPS Politechniki Poznańskiej ? wersja elektroniczna udostępniana studentom przed przystąpieniem do zajęć.
2. Gawędzki W., Pomiary elektryczne wielkości nieelektrycznych, Wydawnictwa AGH, Kraków 2010
3. Miłek M., Pomiary wielkości nieelektrycznych metodami elektrycznymi, Wydaw. Politechniki Zielonogórskiej, Zielona Góra 1998
4. Kaczmarek Z., Pomiary wielkości nieelektrycznych metodami elektrycznymi. Laboratorium , Wydaw. Polit.Św., Kielce , 1991
5. Brignell J., White N. , Intelligent sensor systems, Institut of Physics Publ., Bristol, 1994
6. Jermak Cz.J., Przetworniki pomiarowe, Wydaw. Politech. Pozn., Poznań, 2009

Additional bibliography:

1. Pomiary : czujniki i metody pomiarowe wybranych wielkości fizycznych i składu chemicznego / pod red. Janusza Piotrowskiego ; [Aut.: Dariusz Buchczik [!] et al.]. Wydawnictwa Naukowo-Techniczne, Warszawa :, cop. 2009.
2. Internationales Wörterbuch der Metrologie, DIN Deutsches Institut für Normung, Beuth Verlag, Berlin, 1994

Result of average student's workload

Activity	Time (working hours)	
1. Preparation for laboratory	8	
2. Participation in laboratory exercises	15	
3. Storing the content of exercises and report	10	
4. Participation in the completion	1	
Student's workload		
Source of workload	hours	ECTS
Total workload	34	2
Contact hours	17	1
Practical activities	34	1